

Ethyl Carbamate Research

Industry Continues to Conduct Own Ethyl Carbamate Studies as Federal Report Ambles Toward Completion

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At a panel discussion held at the recent **Unified Wine and Grape Symposium**, it was mentioned that tests and monitoring of wine shipments during the hot summer months have shown that ethyl carbamate formation doubles with each 14-degree Fahrenheit rise in temperature.

The Canadian government since 1985 has had a limit of 30 ppb (parts per billion) on ethyl carbamate in wines (and 100 ppb in fortified wines.) The **Liquor Control Board of Ontario** in Canada has frequently found high levels of ethyl carbamate in wines shipped to that country during the hot summer months.

The LCBO pre-tests small lots of wines before approving the shipment of large quantities. It has established a lower limit (85 percent of the maximum allowable limit) of ethyl carbamate in pre-shipment testing because of the shipping/overheating factor. If pre-shipment testing shows ethyl carbamate levels that are already close to the maximum limit, the products will be rejected.

Why this concern for ethyl carbamate? Because that naturally-occurring chemical, also known as urethane, has proven to be a carcinogen for animals.

Ethyl carbamate forms during fermentation of alcoholic beverages and foods. If a product is then intentionally heated, as with some sherries and bourbons, its levels increase. The problem is that levels can increase if it is also *unintentionally* heated.

It's not just winemakers who need to be concerned. Bourbons can contain several hundred ppb, and some brandies have been tested as high as 12,000 ppb. Urethane has been found in wine, beer, orange juice, some soft drinks, bread, soy sauce and yogurt.

Although ethyl carbamate is a known carcinogen for some animals, its effects on humans is not yet known. Therefore, as a **US Food and Drug Administration** newsletter reported in April 1988 (and again in September of that year), "at FDA's request, the National Toxicology Program is giving urethane its highest research priority in 1988", and the research would be completed "in the next few years." That "highest research priority" report, initiated 14 years ago, is now expected to be released in 2003.

In the meantime, **Wine Institute** is funding its own research on causes and precursors of ethyl carbamate in a joint project at **University of California at Davis** and **California State University, Fresno**. The Institute is also funding work at Davis aimed at improving methods of analysis for the ethyl carbamate precursor, urea.

Wine Institute's public policy spokesman **Wendell Lee** says the organization is optimistically cautious about the upcoming report. "While we don't anticipate anything major in the report," said Lee, "we want to be prepared just in case the report says the problem is more serious than is currently believed. By doing our own research, we can continue to seek ways to minimize the presence of EC in wine."

Greg Hodson, research director at **E&J Gallo Winery**, is chairman of Wine Institute's Ethyl Carbamate Working Group. He reported that Wine Institute's funding of the projects has two main aims. "First, we want to satisfy ourselves that we have not overlooked any constituents of wine that might function as EC precursors, although we know the major ones. Second, current analytical methodology for urea (the most significant EC precursor in wine) has the potential to be improved significantly and this is being investigated."

UC Davis Associate Enologist **Christian Butzke**, who moderated the Unified Symposium panel, has been heading studies funded by the **American Vineyard Foundation** on the effects of temperature extremes and fluctuations on wine during shipment. He reports that the university has worked with California wineries on the issue since it became relevant in 1985. Butzke states "Since then, we have established the main causes for its biological formation in wine, developed assays that minimized the potential for its formation, and addressed all other aspects relating to it viticulturally and enologically in a "EC

Preventative Action Manual." This manual, which details findings and recommendations, is available on the US Food and Drug Administration's website at www.cfsan.fda.gov/~frf/ecintro.html.

The introduction to the manual presents the current attitude in the wine industry regarding EC: "Ethyl carbamate is a naturally occurring component of all fermented foods and beverages. Because EC has shown a potential for carcinogenicity when administered in high doses in animal tests, the wine industry is interested in reducing EC levels in their products.

"This advisory contains recommendations drawn from scientific research that are designed to help all winegrape growers, winemakers, and other industry members to minimize the levels of EC in wine. These recommendations are advisory only, and not intended to restrict the freedom and diversity of winemaking styles."

Butzke credited the wine industry for its efforts so far. "Good winemaking practices and application of these recommendations over the years have led to the fact that American wines now have the lowest levels of EC in international comparison," he said.